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# NICOTINE-RELATED NEUROCHEMICAL CHANGES: SOME IMPLICATIONS FOR MOTIVATIONAL MECHANISMS AND DIFFERENCES[1]

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Some of the possible ways in which the pharmacological role of nicotine underlies the smoking habit have been reviewed by other investigators (Murphree, 1967; Larson and Silvette, 1968; Jarvik, 1970). The favored view holds that the motivational relevance of nicotine resides in its effects upon the central nervous system (Murphree, 1967). For the most part these effects have been resolved with a central catecholamine hypothesis (Burn, 1960). This chapter will redirect attention to the fact that, either directly or indirectly, nicotine also induces other biochemical changes in the brain, changes which could as well have motivational significance.

Work already reported by this writer has related changes in the motivated behavior of experimental animals to (*a*) changes in the concentration and turnover of 5-hydroxytryptamine (Essman, 1969), and to (*b*) changes in the central cholinergic system (Essman, 1971a). The relevance of the effects of nicotine to these reported relationships is to be found in the observation that nicotine induces changes in both the central indoleamine and cholinergic systems (Essman, Golod, & Steinberg, 1968; Essman, 1971a). These findings and the meagerness of evidence to support the central catecholamine effect of nicotine (Westfall, Flemming, Fudger, & Clark, 1967), suggest that any attempt to investigate motivation in human smoking should include a study focused upon the effects of nicotine upon the central indoleamine and cholinergic systems.

In order to study the central nervous system effects of nicotine, we have chosen 5-hydroxytryptamine (5-HT) and acetylcholine (ACh)—considered on a regional, cellular, and subcellular level. We have also investigated the possibility that differences in central amine level and metabolism are related to differences in the

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